

DO Comparison Report
R/V Brooks McCall, 19 May 2010
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Preliminary data from the first leg of the R/V Brooks McCall oil spill response cruise (5-10 May) included measurements of DO concentrations in the water column via a Winkler chemistry using a LaMotte DO kit. The data suggested severely depleted dissolved oxygen (as low as 0.5 mg L^{-1}) at depths throughout the water column. This was a troubling finding because it implied that the oil and/or dispersants may be causing DO depletion in the area, which could be a threat to marine life. This possibility had also been brought up in sensationalized media reports from a recent cruise on the R/V Pelican. Beginning on the 2nd leg (~5/15-5/19), 2 additional independent means of measuring DO were employed for comparison the LaMotte kit. These included: 1) a brand new and freshly calibrated Seabird SBE43 DO sensor which collects continuous profiles of DO in the water column and 2) an Ex-Tech hand-held DO probe which is calibrated before each use against water-saturated air. The Ex-Tech probe was used on discrete water samples collected from the Niskin bottles. After analysis of all 3 data types, it became very clear that the 2 DO probes agreed almost perfectly with each other (Fig 1), both of which were much higher than comparable measurements using the LaMotte kit. It therefore appears that the initial LaMotte results were biased low for unknown reasons. Further comparisons with historical DO data (Fig 2) clearly showed that both DO probes reproduced the expected vertical distribution, both qualitatively and quantitatively, that is a permanent feature of deep Gulf of Mexico waters. Based on this analysis, we conclude that we currently have no credible evidence to support the theory that DO concentrations are abnormal in the immediate vicinity of the oil spill.

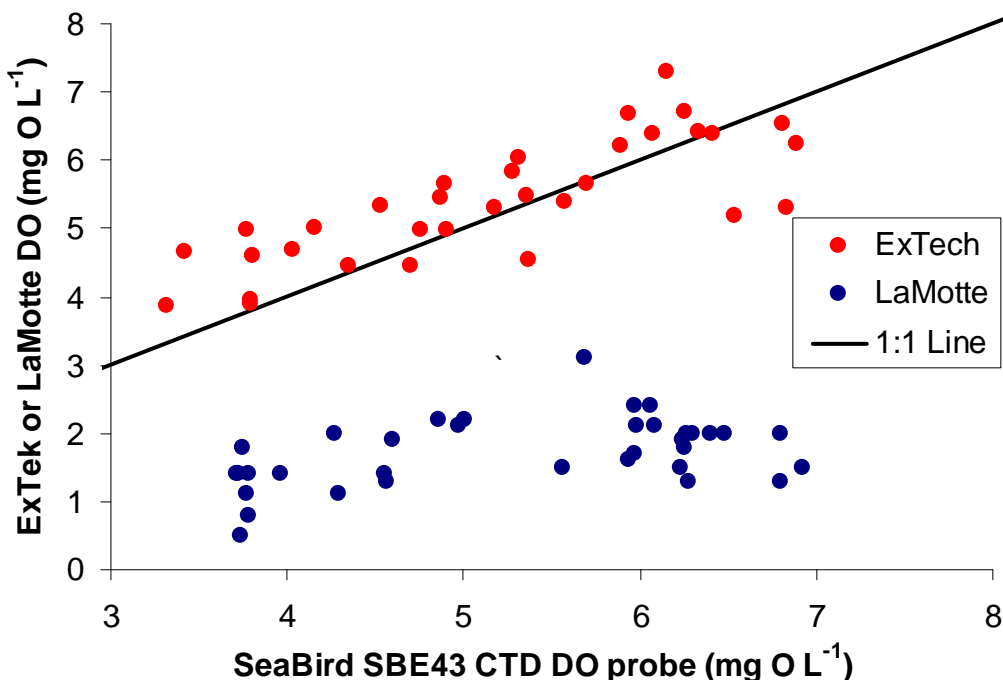


Figure 1: Comparison of Seabird DO sensor, Ex-Tech handheld DO sensor, and DO measured via a LaMotte kit. The Seabird DO data were extracted from continuous profiles from the depths matching the depths where Niskin samples were collected.

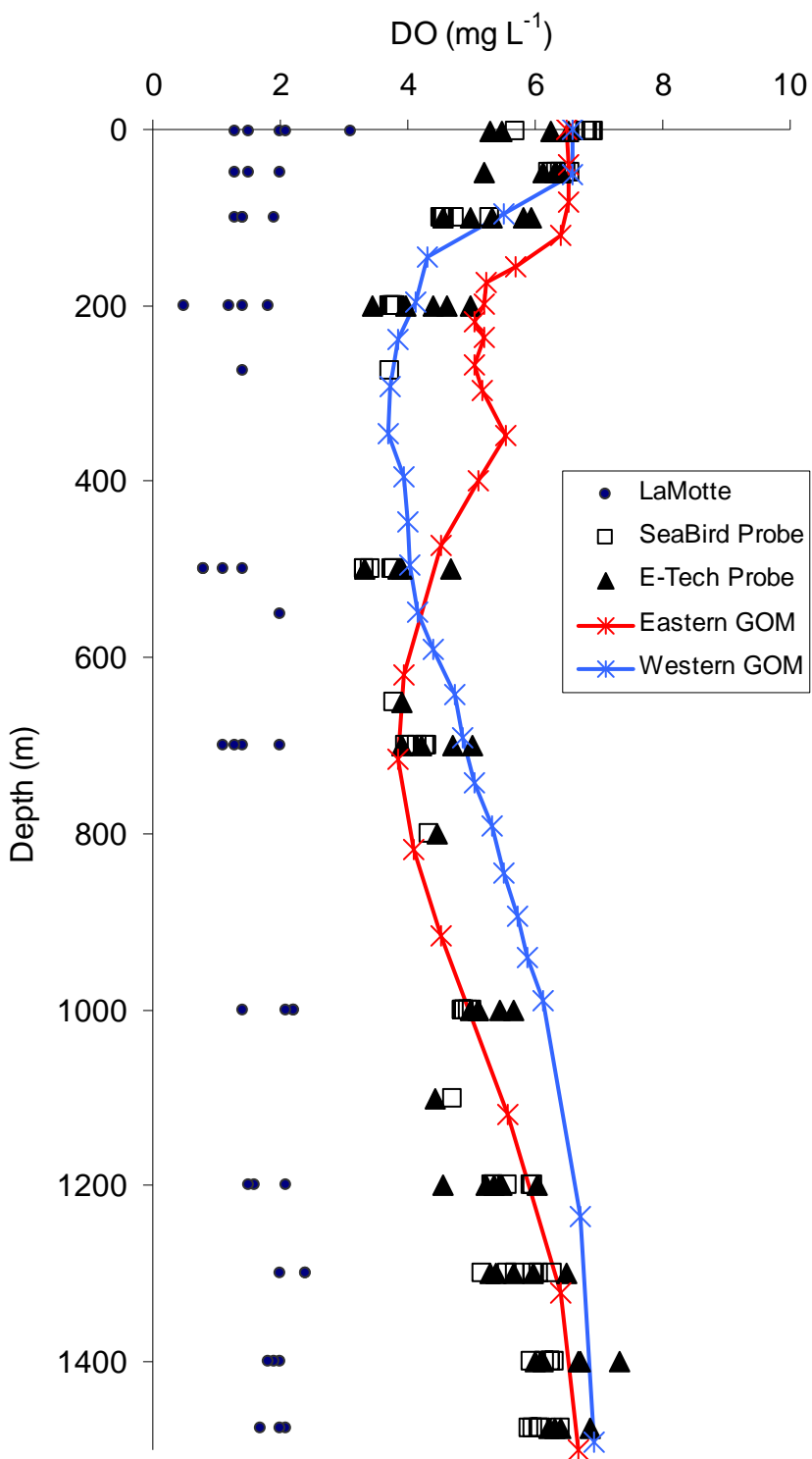


Figure 2: Water column DO from all 3 measurement sources (LaMotte, Ex-Tech, and SeaBird) plotted as a function of depth. Overlain are historical data (reproduced from Fig 8.2 in Schiller et al. 1999), which exemplify the permanent water column DO structure from sites in the eastern and western Gulf of Mexico. The close agreement between historical data and the 2 DO probes further indicates that the LaMotte measurements were biased low.